BERWICK ELECTRIC METAL HEATERS

BERWICK
Electric Metal Heaters

AMERICAN CAR AND FOUNDRY COMPANY

165 Broadway
New York City

CHICAGO
Railway Exchange Bldg.

ST. LOUIS
Syndicate Trust Bldg.

BERWICK
Electric Rivet and Metal Heaters

THE BERWICK PLANT of the American Car and Foundry Company, since 1912, has been experimenting with and developing Electric Heaters for the heating of rivets by electricity. Machines for this purpose were perfected in November, 1919; in the following two years nearly one thousand (1000) Heaters were built. That they are successful is attested by the comments printed on the following pages.

Electric Heaters for heating one end of a rod for bolt-heading or upset work, for heating the corners of plates for scarfing, and for heating rivets in assembled conveyor chains, are illustrated on pages 20 to 23.

Our Experimental Department is now developing an automatic Heater for the heating of bolt-blanks, and blanks for other similar work; a Heater for drop forging and upset work; a Heater for bar stock 20, 30, or more feet in length, of any cross-sectional area from

3/8″ up to 1½″; likewise Heaters to heat automobile springs; for spot, billet, pipe, spring heating, etc.

The heating of metals by direct application of an electrical current is practically in its infancy. Should you have any heating problem where the metal to be heated is of such shape that it can be used as a resistance, and will submit your proposition, we will lend our best efforts to develop a Heater to suit your requirements.

AMERICAN CAR AND FOUNDRY COMPANY

February, 1922.

A smoky past can be changed
to a cleanly future

The BERWICK Electric Rivet Heater

No. 1 Berwick
Electric Rivet Heater
with two electrodes for 5/16", 3/8", 7/16" and 1/2" diam. rivets up to 5" long

THE BERWICK ELECTRIC RIVET HEATER eliminates dirt, gas, smoke and intense heat. It was designed to overcome the objectionable features found in heating rivets by oil, gas, coal or coke; to reduce excessive costs of heating; to eliminate the large percentage of waste rivets.

Design

The BERWICK ELECTRIC RIVET HEATERS are heavy, substantial and compact, simple to operate, with practically no maintenance cost.

Four (4) types of Heaters are built:

The No. 1, for heating 1/4" to 1/2" rivets;
The No. 2, for heating 3/8" to 3/4" rivets;
The No. 3, for heating 5/8" to 1" rivets; and
The No. 4, for heating 1" to 1 3/4" rivets.

Rear View
No. 1 Berwick Electric
Rivet Heater,
portable on wheels or by crane

While rivets of greater or smaller diameter may be heated on other types of Heaters than indicated, it is not advisable, except in cases of emergency, to do so. This is true, not because of any resultant damage to the Heater, but on account of the fact that when small rivets are heated on a large type machine, great care must be exercised to prevent them from burning, and thereby destroying the rivet; and vice versa, when rivets of large diameters are heated on the smaller type of Heater, it takes a longer period of time and greater consumption of current.

Each type is built in several sizes, as indicated in the schedule on page 26. The same schedule gives the approximate hourly ratings, the electrical demand, weights, floor-spaces, etc.

No. 2 Berwick Electric Rivet Heater
with two electrodes for 3/8", 1/2" and 5/8" diam. rivets up to 4 3/4" long

Rear View
No. 2 Berwick Electric Rivet Heater
portable on wheels or by crane

Operation

The operation of the Heater is very simple. After the power-line in the plant is connected to the two posts on the radial switch located in the interior of the Heater, the controlling knife or dial-switch should be placed in the lowest speed. The hand or line-switch at the left of the operator should be placed in the open position, and by placing the foot on any one of the foot-treadles the lower jaw of the corresponding electrode is opened sufficiently to receive the rivet. The rivet being inserted, the line-switch at the left of the operator should be thrown into its clip, when the rivet will start heating.

The successive electrodes can then be opened by placing the foot on the foot-treadles, and additional rivets inserted.

A hot rivet should be obtained in from 15 to 30 seconds, depending entirely upon the diameter and length of the rivet being heated.

Each electrode or heat-unit works independently and consumes no more current than its proportionate share when all electrodes or heat-units are in operation.

The only requirement is an electrical connection to *alternating current* of standard frequencies and voltages. The Heater, being single-phase, can be connected singly to any leg of an A. C. line, or two or three Heaters can be connected across any two wires of a two or three-phase line without any serious disturbance to the same.

A variable voltage, and thus a heat-control, is provided in the shape of a radial switch, so that the time of heating rivets can be varied as conditions necessitate, the smaller diameter and shorter length rivets requiring less current than the larger diameter and longer length rivets.

Advantages

The primary object of the BERWICK ELECTRIC RIVET HEATER is to reduce the excessive cost of heating rivets; to improve working conditions in the erecting shop, hulls of vessels, etc., by eliminating smoke, gases (which are injurious to the workmen), and intense heat (which is not only enervating to the heater boy, but also to the hammer-gang); to eliminate pipe connections for oil and gas, and air blast connections for oil, coal and coke Heaters; to eliminate the 30 minutes' delay in firing-up before charging and the continual burning throughout the day of the fuel-furnaces; further, to eliminate burned and scaled rivets, and to effect a large saving by reducing this rivet loss from 10% to less than ½ of 1%.

Flexibility is provided by placing the Heaters in close proximity to the work in hand, thereby eliminating both loss of time and waste of rivets.

The fire hazard is reduced to the lowest minimum by the removal of fuel-burning open fires in your plant.

Benefits

Absolute portability, with close proximity to work.

Fifteen to thirty seconds' notice for hot rivets.

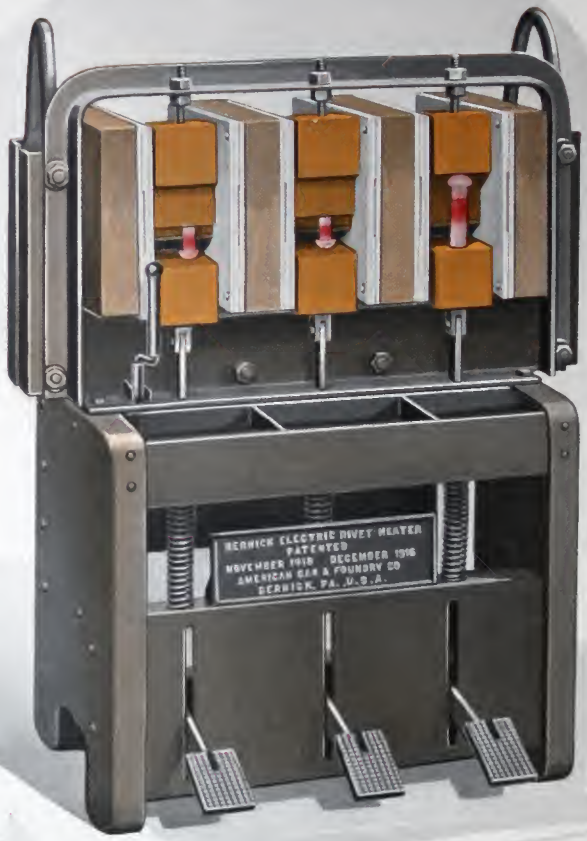
The use of electric current only when rivets are being heated.

The individual heating of rivets, one by one, eliminating rivet wastage.

Absolute control.

Elimination of fire risks.

Elimination of heater boy's bad or indifferent judgment as to amount of fuel consumption, and quantity of rivets in furnace at closing time; these two items are the greatest source of rivet loss by other heating methods.



No. 3 Berwick Electric Rivet Heater
with three electrodes for 5/8", 3/4", 7/8" and 1" diam. rivets up to 5 1/4" long, or longer if desired

Electric current passes equally through all portions of a rivet, atmospheric conditions keep the outer surface of the rivet cool, and the core of the rivet heats first, which heat radiates from the center to the outer surface; so that when the rivet is withdrawn from the Heater the intense heat at the core, flowing outwardly, insures a properly heated rivet under all conditions.

Rear View
No. 3 Berwick Electric Rivet Heater
provided with chain hoists

History

Since 1912, the Berwick Plant of the American Car and Foundry Company has been constantly improving the Electric Heater; all the so-called experimental features have been eliminated, and a Heater has been perfected which gives a constant and steady supply of rivets properly heated. There are no scaled or burned rivets, no smoke, gas or dirt, heating cost is reduced 25 to 75 per cent, and rivet loss reduced to less than ½ of 1 per cent. This saving, when the Heaters are working at full capacity daily, is sufficient to cover the entire cost of the machine in a short time and, in addition, the working conditions in the erection shop and in vessel hulls are vastly improved.

Savings

Eleven to twenty kilowatt hours (see Tests, pages 18 and 19) will heat a hundred pounds of any size rivets. It is a simple matter, by using these figures, to compute what your electric power cost will be, as compared to your present fuel cost, plus maintenance cost, rivet wastage, lost time in starting up fuel-furnaces, and air cost. The maintenance charge is practically nil, as compared with the heavy charge for relining and upkeeping of all other types of fuel-furnaces. In the Berwick Electric Rivet Heater no current is used until a rivet is placed between the electrodes and the line-switch thrown in; hence, only current sufficient to heat each rivet is consumed. There is no continual burning throughout the day as in fuel-heating furnaces.

No air is required, with leaky valves and joints, and constant cost of upkeep. There is no lost time waiting for rivets at the beginning of shifts, or when special rivets are required throughout the day.

The furnace boy has only two, three, four or five vertically placed rivets to watch, in plain view, with no intense heat or flame to contend with. The loss of spoiled rivets can be entirely eliminated. Compare this with your ordinary loss of scaled, burned and the large batch of matted rivets withdrawn from your present furnace at closing time: *a 10 per cent rivet loss changed to less than ½ of 1 per cent.*

Information

Microscopic photographs taken in laboratory tests show no indication as to how the metal is heated, whether by oil, coke or electricity. These tests all show, however, that most of the rivets submitted for test, and supposedly properly heated, have as a matter of fact been overheated. Recommendations from these metallurgical departments are to the effect that, where possible, rivets should be heated to a lesser degree, preferably not over 1650 degrees Fahrenheit.

In fuel-heating furnaces, the heating begins at the outer surface, penetrating the rivet until it reaches the core. As a consequence, most hammermen and foremen insist that the rivet have the appearance approximating a white heat before it is of sufficient heat to be driven. An analysis of such a rivet will show a starting of a deterioration of the metal. An electrically heated rivet shows the reverse; the current, as nearly

No. 3 Two-Electrode Berwick Electric Rivet Heater
with telescopic hood

No. 3 Three-Electrode Berwick Electric Rivet Heater
with telescopic hood open

No. 3 Three-Electrode Berwick Electric Rivet Heater
with telescopic hood closed

as can be ascertained, passes equally through all portions of the rivet, and as the atmosphere keeps the outer surface cool the core becomes hot first and the heat radiates from the core to the outer surface. It is, therefore, necessary for the foremen, hammermen and heater boy to determine what appearance the rivet heated electrically should have, in order to produce the desired color in the heated rivet.

Daylight plays a very important factor, and a rivet heated electrically—being exposed to daylight—does not indicate its true heat. If, therefore, the rivet is withdrawn from the BERWICK ELECTRIC RIVET HEATER the moment the neck of the rivet shows a faint indication of change in color and this rivet is thrown into a dark corner where there is no light or to the rear of a nail-keg laid on its side, within ten seconds it will change in color to a bright yellow.

These experiments should be conducted until the foremen and hammermen are satisfied that the rivet approaches the color at which they wish to drive it, bearing in mind that the core at all times is hotter than the outer surface, and that consequently less hammer-blows are necessary to head the soft core, than the hard core of a fuel-heated rivet.

Fifteen or twenty minutes' experimenting will determine the approximate color that a rivet should have in the BERWICK ELECTRIC RIVET HEATER when ready for use.

Eighteen months' selling and demonstrating the BERWICK ELECTRIC RIVET HEATER have developed the fact that the major objection to heating electrically is due to the foremen and hammermen not appreciating the fact that daylight prevents a rivet from showing its true heat, and the feeling that a rivet must show a white heat.

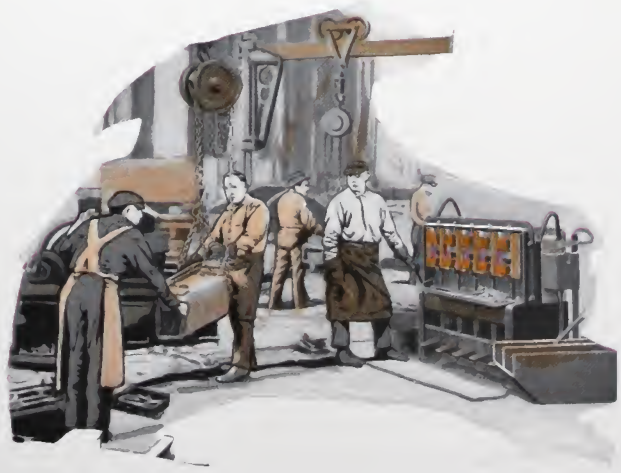
"We are very much pleased with this Heater and consider same superior to any other method of heating rivets that we have ever used.

"We have three of the Heaters in operation at the present time and have recently placed an order with you for three more which we hope to get installed shortly."

GEO. T. SMITH, *Gen'l Superintendent*
THE WALSH & WEIDNER BOILER COMPANY
Chattanooga, Tenn.

"This Heater was placed in service in August, 1920, and has given entire satisfaction."

MR. GEO. F. HESS,
WABASH RAILWAY, Decatur Ill.



BERWICK ELECTRIC RIVET HEATERS

The following Summary was compiled from daily records kept from February, 1914, to May 24, 1920, at our Berwick Plant, the rivets being heated on experimental Heaters, as our present Heater was not finally perfected until November, 1919.

In the Summary are given the actual figures of saving where a certain per cent of the rivets were heated electrically and the balance by oil; and then for comparison are submitted figures showing just what would have been the actual saving had all rivets been heated electrically.

No. 3 Five-Electrode Berwick Electric Rivet Heater

for heating 5/8" to 1" diam. rivets up to 5 1/4" in length or longer if desired

"The Heaters are doing good
J. A. Murray,
General Mot

A Reminde

Passenger Car Department

1914 to date — May 24th, 1920.

Letter August 13th, 1914

Oil Furnaces February-March, 1914

Average number furnaces per day	30
Average weight rivets for furnaces per day	75.5 lbs.
Average fuel oil cost for furnaces per day	$1.23
Average cost per 100 lb. rivets	$1.63

Electric Rivet Heating

Average cost per 100 lb. rivets	.34
Average Heaters in use per day beginning July 20, 1914	10

Year	Oil per 100 Gallons	Elec. Power per K.W.H.	Cost Oil Heating per 100 lbs.	Cost Electric Heating per 100 lbs.	Saving per 100 lbs.
1914	$3.50	.0125	$1.63	$0.34	$1.29
1915	3.50	.0125	1.63	.34	1.29
1916	3.69	.0125	1.72	.27	1.45
1917	5.50	.00866	2.56	.187	2.373
1918	9.00	.011	4.18	.238	3.942
1919	11.00	.0136	5.13	.294	4.836

It is estimated that from September, 1914, to June, 1915, one-third of the rivets were heated on Electric Rivet Heaters. Since that date, 75% were heated electrically.

Year	Cars	Lbs. rivets per car	Net lbs. rivets	Saving per cwt.	Yearly saving
1914-1915	215	33% of 1324	94,887	$1.29	$1223.10
From June, '15	121	75% of 1324	120,200	1.29	1550.00
1916	312	75% of 1324	310,000	1.45	4496.50
1917	125	75% of 1560	146,400	2.373	3475.00
1918	No cars	built, Auto trucks, no data		3.94	
1919	102	75% of 1366	104,450	4.836	5046.40
Total	875	1,192,288 lbs.	775,937 lbs.		$15,791.00
					$18.00 per car

ork. Count us as boosters."
Works Manager,
RS TRUCK CO., Pontiac, Mich.

r of the Past

Freight Car Department

1919—April 1920

May 24th, 1920.

From Summary Cars Built:

1919—10,985 cars, weight rivets.....5,513,308 pounds

1920—5,071 cars, weight rivets.....2,825,666 pounds

It is estimated that 25% of rivets were electrically heated in 1919 and 1920, or

1919...1,378,424 pounds

1920.....706,416 pounds

Figuring from another angle:

33 Heaters 215 days, 8 hours @ 45 lbs. per hour, 54% load factor, 1,379,268 pounds

39 Heaters 89½ days, 8 hours @ 45 lbs. per hour, 56% load factor, 703,000 pounds

No. 4 Berwick Electric Rivet Heater
with one, three or five electrodes for 1″ to 1¾″ diam. rivets, up to 5¾″ in length or longer if desired

1919—Oil Heating rivets per cwt.....	$1.44	Fuel Oil $11.50 per 100 gal.
	.12	Pumping, Blast and Maintenance
	$1.56	
Electric per cwt.....	.32	at 1.36¢ current.
	$1.24	Saving.
1920—Oil Heating rivets per cwt.....	$1.11	Fuel Oil $8.50 per 100 gal.
	.12	Pumping, Blast and Maintenance
	$1.23	
Electric per cwt.....	.32	
	$ .91	Saving.

Net Saving, 1919, 10,985 cars, 1,378,424 lbs. @ $1.24 per cwt.....	$17,096.00
Net Saving, 1920, 5,071 cars, 706,416 lbs. @ $ .91 per cwt.....	6,425.00
Total, 16,056 cars, Electric Heating 25% of rivets.....	$23,521.00
	Per Car $1.47

Summary

May 24th, 1920.

Partially equipped Electric Rivet Heaters

Passenger Car = 64 months—875 cars—775,937 lbs.—Saving . . . $15,791.00 Total

Average { $247.00 per mo. / 18.00 per car / 2.03 per cwt.

Freight Car = 16 months—16,056 cars—2,084,840 lbs.—Saving . . $23,521.00 Total

Average { $1,465.00 per mo. / 1.47 per car / 1.13 per cwt.

Above entirely equipped Electric Rivet Heaters

Passenger Car = 64 months—875 cars—1,192,288 lbs.—Saving . . $24,200.00 Total

Average { $378.00 per mo. / 27.65 per car / 2.03 per cwt.

Freight Car = 16 months—16,056 cars—8,338,974 lbs.—Saving . . $94,078.00 Total

Average { $5,860.00 per mo. / 5.86 per car / 1.13 per cwt.

"Our experience with these heaters so far has been that they are a very satisfactory and economical means of heating rivets for our car construction work. With the rearrangement of certain portions of our electric power equipment, we expect to very considerably extend the use of the electric rivet heaters."

C. W. Wrenshall, *General Superintendent*,
Pressed Steel Car Company, McKees Rocks, Pa.

"We have had one of your Berwick Electric Rivet Heaters in service approximately six months and it has given entire satisfaction. The maintenance cost has been nothing, and the machine is very much liked by mechanics on account of its ease of operation and the absence of smoke."

B. T. Wood, *Vice President and Chief Purchasing Officer*,
St. Louis-San Francisco Railway Company, St. Louis, Mo.

* * * "we have used these Heaters in this Plant for some little time, and have been very well satisfied with their operation."

S. W. Wakeman, *General Manager*,
Bethlehem Shipbuilding Corporation, Ltd.,
Fore River Plant, Quincy, Mass.

"We have two of your Berwick Electric Rivet Heaters in our shops. They have given excellent service and we shall be glad to recommend these Heaters to any one in need of equipment of this type."

F. P. Norris, *Manager*,
The Phoenix Iron Company,
Phoenixville, Pa.

BERWICK ELECTRIC RIVET HEATERS

View of No. 1 Two-Electrode Heater operating on industrial track with overhead trolley in Hydraulic Pressed Steel Company's Plant, Cleveland, Ohio. Heater moves 1200 feet an hour, heater boy heating and sticking an average of eight rivets per minute

"For economy of heat, lack of waste rivets, cleanliness of operation, and thorough distribution of heat there is no comparison possible between heating electrically and any other way we know of.

"We are glad to say in the past year that we have used them we have had no maintenance expense at all."

W. E. Irish, *Plant Engineer*,
Hydraulic Pressed Steel Company,
Cleveland, O.

"We have been using the Berwick Electric Rivet Heaters throughout our plant for more than one year and they have proved to be satisfactory in every way. The rivets heat more quickly, scale less and with practically no loss by heating. The adoption of electric heating has solved the rivet heating problem for us."

R. G. Clapp, *Purchasing Agent*,
Brown Hoisting Machinery Company,
Cleveland, Ohio.

"We have found Berwick Electric Rivet Heaters very satisfactory both on account of the saving in operation and elimination of heat in the shop, besides doing away with gas and smoke."

A. Van Hassel, *Secretary*,
Magor Car Corporation,
30 Church Street, N. Y. C.

"We cannot speak too highly of the Heater; it is such an improvement over the old method that there is no comparison."

Wm. Callum,
Federal Iron Works,
3545-55 Shields Ave., Chicago, Ill.

LABORATORY FIGURES COMPILED FROM TESTING SEVERAL HUNDRED HEATERS DURING THE YEARS 1920-1921

Type Heater	Size of Rivets	Rivets per Hour Taps as marked on Heaters				Pounds per Hour Taps as marked on Heaters				K.W.H. per 100 Lbs. Taps as marked on Heaters			
		X	1	2	3	X	1	2	3	X	1	2	3
No. 1-2	½"x2" ⅜"x2⅛" ¼"x2⅛"	348	408	480		53.9	33.9			16.8	17.0		
No. 2-2	⅝"x3" ½"x2⅞" ⅜"x3¼"	276	234	231		95.8	44.7	27.		9.2	15.4	16.6	

(*Continued on page 19*)

LABORATORY FIGURES COMPILED FROM TESTING SEVERAL HUNDRED HEATERS DURING THE YEARS 1920-1921—*Continued*

Type Heater	Size of Rivets	Rivets per Hour Taps as marked on Heaters				Pounds per Hour Taps as marked on Heaters				K. W. H. per 100 Lbs. Taps as marked on Heaters			
		X	1	2	3	X	1	2	3	X	1	2	3
No. 3-1	1″x4″	84	60			98.7	70.5			15.1	13.7		
	7/8″x4″	105	80	60		92.1	70.2	51.7		13.8	12.9	12.4	
	3/4″x4″	140	96	80		89.6	61.4	51.2		13.9	14.1	15.	
No. 3-2	1″x4″	108	70			126.9	82.3			18.5	14.5		
	7/8″x4″	120	90	70		105.4	78.9	61.4		17.6	18.2	18.4	
	3/4″x4″	156	120	90	75	99.8	74.8	57.6	48.	14.4	14.8	14.3	16.6
No. 3-3	1″x4″	210	160			246.8	188.			15.3	12.5		
	7/8″x4″	264	204	150		231.7	179.	131.6		13.6	12.8	16.7	
	3/4″x4″	357	256	194	168	228.5	163.8	124.2	107.5	15.1	12.8	14.1	16.7
No. 3-5	1″x4″	317	271			372.6	318.8			17.1	14.4		
	7/8″x4″	405	342	286		355.4	300.1	251.6		14.4	14.	14.4	
	3/4″x4″	540	440	300	287	345.6	281.6	192.	183.5	15.	14.1	14.8	15.2
Special Test	7/8″x2 3/4″		875				588.4				11.5		
	3/4″x2 1/2″		756				338.7				14.		
No. 3-5 For machine riveting only.	5/8″x2 1/4″			978				276.4				11.7	

No. 4-1, No. 4-3, No. 4-5 } No. 4 Heaters are built special, heating from twelve (12) to twenty-five (25) rivets or blanks, up to twenty (20) inches long per hour per electrode, according to size of material heated.

"We have been using one of your Berwick Electric Rivet Heaters for the past twelve (12) months, and take pleasure in stating that it has given entire satisfaction.

"The Heater does all that is claimed for it and is considered a great improvement over the old-fashioned method of heating rivets."

H. J. WARTHEN, *Superintendent Motive Power*,
RICHMOND, FREDERICKSBURG & POTOMAC RAILROAD CO.,
Richmond, Va.

"Our Manufacturing Department advise that the twenty-one (21) Berwick Electric Rivet Heaters, which we have in our Schenectady Plant, have proven very economical and satisfactory in operation as compared with either oil or coal fired rivet heating furnaces, and naturally we are very well pleased with them.

"When we are in the market for more electric rivet heaters you will certainly hear from us."

ANDREW FLETCHER, *President*,
AMERICAN LOCOMOTIVE CO.,
30 Church Street,
New York City.

View of assembly floor in the Hydraulic Pressed Steel Co.'s Plant

No. 4 Five-Electrode Berwick Electric Heater

made to open from four inches to twenty-four inches. Data derived from tests at the Zelienople Plant of the American Flexible Bolt Company on their flexible bolt stock using this Heater is given on the opposite page.

The BERWICK Electric Metal Heaters

BERWICK ELECTRIC METAL HEATERS follow the same general electric principles as have made the Rivet Heaters so successful. Consequently these Heaters show the same economic savings and advantages as have been proven by those using the Berwick Electric Rivet Heaters.

"Sometime ago we put in a trial order for an Electric Rivet Heater and have since equipped our Roanoke shop entirely with this type of Heater, as we have found it to be even more economical than you claim and in fact one of the best additions to our plant equipment that has been made in years.

"We are now making arrangements to equip both our plants 100% with Electric Rivet Heaters."

ROBERT J. MEYBIN, *General Manager*,
VIRGINIA BRIDGE & IRON CO.,
Roanoke, Va.

(Additional order for ten Heaters placed December 15th, 1921.)

TESTS OF HEATING STANDARD L. W. STAYBOLTS ON BERWICK ELECTRIC HEATER

Stock Diam.	Bolts	Bars	No.	Mult.	No. Bolts	Time Min.	Iron Heated per Hr., Lbs.	Tap
15/16″	7/8″ x 5″	15/16″ x 20″	24	4	96	28	250	#1
	7/8″ x 8″	15/16″ x 21 3/16″	22	3	66	26 1/2	263	1
	7/8″ x 8″	15/16″ x 14 1/8″	10	2	20	5 1/2	594	3
	7/8″ x 11″	15/16″ x 19″	20	2	40	16	364	1
1″	15/16″ x 5″	1″ x 19 1/2″	22	4	88	19 1/2	370	1
	15/16″ x 7″	1″ x 18 9/16″	22	3	66	16 1/2	420	1
	15/16″ x 11″	1″ x 18 1/8″	29	2	58	20	428	1
1 1/16″	1″ x 5″	1 1/16″ x 19 1/4″	21	4	84	22	364	1
	1″ x 7″	1 1/16″ x 18 15/16″	21	3	63	17 3/4	442	1
	1″ x 11″	1 1/16″ x 18 1/2″	23	2	46	18 1/2	434	1
1 1/8″	1 1/16″ x 5″	1 1/8″ x 19 1/4″	24	4	96	23	426	1
	1 1/16″ x 7″	1 1/8″ x 18 3/8″	20	3	60	19 1/2	417	2
	1 1/16″ x 11″	1 1/8″ x 17 3/4″	22	2	44	20 1/2	408	2
1 3/16″	1 1/8″ x 5″	1 3/16″ x 18 3/4″	20	4	80	18	515	1
	1 1/8″ x 7″	1 3/16″ x 18″	100	3	300	71	483	1
	1 1/8″ x 11″	1 3/16″ x 17 1/8″	80	2	160	60	422	2
1 1/4″	1 3/16″ x 5″	1 1/4″ x 18 3/4″	22	4	88	28 1/2	382	2
	1 3/16″ x 8″	1 1/4″ x 18 3/4″	22	3	66	21 1/2	506	1
	1 3/16″ x 11″	1 1/4″ x 16 3/4″	24	2	48	21 1/2	483	2
1 5/16″	1 1/4″ x 7″	1 5/16″ x 17″	23	3	69	22.6	490	1
	1 1/4″ x 9″	1 5/16″ x 20″	28	3	84	36.6	415	1
	1 1/4″ x 9″	1 5/16″ x 20″	65	3	195	82 1/2	407	1
	1 1/4″ x 12″	1 5/16″ x 17 1/4″	48	2	96	47 3/4	488	1

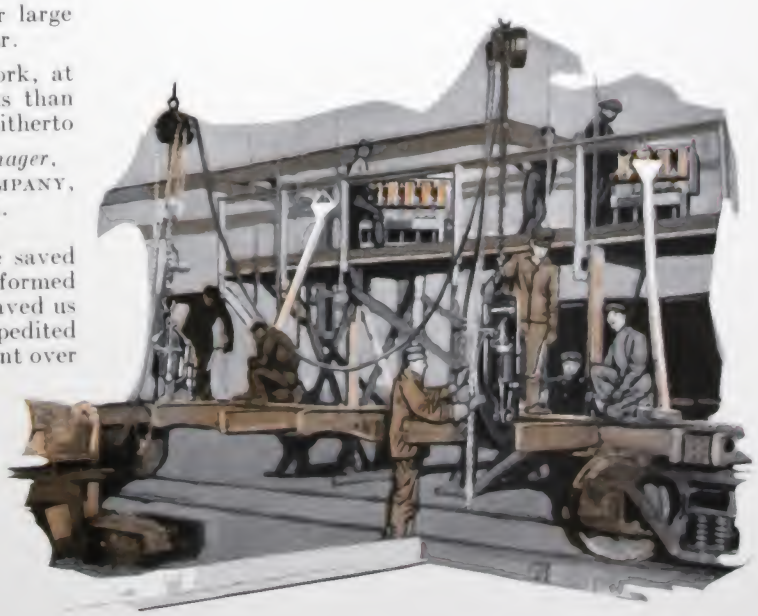
"We have been operating five of your large size electric rivet heaters for the past year.

"We get more work, and better work, at lower cost and with smaller loss of rivets than is possible by any method which we have hitherto used."

L. J. Holmes, *Factory Manager*,
International Motor Company,
Mack Plant, Allentown, Pa.

"I have personally observed the time saved in operating these heaters and I am informed by our Works Manager that they have saved us a great deal of money and have also expedited production. They are a great improvement over the old method of heating rivets."

F. A. Skelton, *Vice-President*,
National Steel Car Corporation, Ltd.,
Hamilton, Canada.



Chain Heater

Sensing the need of a more economical method of riveting conveyor chains such as are used around mines, etc., this heater has been designed. With this machine it is possible to assemble the pins directly in the chain and heat same in position, thus assuring connecting pins properly heated and eliminating any possibility of bad joints due to cold pins.

The machine illustrated is designed for heating two pins at one time and will allow the assembled chain to be pulled across, or through, the gap formed by the electrodes. The method employed is to place the heater in such a position that the chain may be assembled on one side thereof, pushed along so that two pins can be heated at one time. When these have been properly heated, the assembled chain is moved along until the next two pins are in position; the two preceding pins are then riveted over.

With this method one manufacturer has been able to assemble, complete, one foot of chain every fifteen seconds, and since installation has been able to reduce his labor costs seventy-five per cent.

Can be furnished in four (4) sizes: No. 1, No. 2, No. 3, or No. 4, according to range in diameter of rivets, as indicated on page 26 under corresponding sizes of two-electrode Rivet Heaters.

"We have operated them in our plant for eighteen months and are well satisfied with this method of heating and with your Heaters. We formerly used fuel oil. The Electric Heaters have cut down the time lost by riveting gangs in starting and changing fires, and have nearly eliminated losses from burned rivets in the scrap bins. Although we are paying a fairly high rate for purchased current, our meters have not shown anywhere near sufficient increase to offset the reduction in fuel oil consumption. We have, of course, secured a power saving in compressed air required for oil heating.

"Your Heaters are entirely satisfactory from an operating standpoint. Production is fast enough for a machine riveting crew; they require but slight maintenance and do keep the men on the job in hot weather."

R. F. Symonds, *Works Manager*,
New England Structural Company,
Everett, Mass.

"We are more than satisfied with the Heaters which we have installed. We have had excellent results from the start and have been able to reduce our rivet heating costs very considerably. We have, at the present time, a large number of these Heaters in use and it is our intention to equip all of our plants with this type of Heater."

W. S. Atwood, *Vice-President*,
Canadian Car and Foundry Company, Ltd.,
Transportation Building, Montreal.

Scarfing Heater

This machine has been designed to heat the corners of steel plates. As shown in the cut, the heater is carried to the work by means of a portable hoist. The lower electrode is movable, being controlled by a foot treadle, while the length of heat is controlled by moving the upper electrode in a horizontal direction until the desired opening is obtained. The lower electrode is split, the better to adapt itself to inequalities in the plate to be heated. The following results were obtained from several tests on plates as outlined below:

½″ Plate—4″x5″ corner—242 V., 52 Amp., 7 min.

¾″ Plate—4″x5″ corner—242 V., 72 Amp., 7 min.

"Six months' experience with electric heating of rivets in this plant has shown notable economies over the old coal-fired furnace method, now gradually being superseded on these premises. The best results are being attained by a Berwick Rivet Heater, capable of heating rivets in multiple at once.

"In selecting a rivet heater it was found helpful to secure the benefits of multiple rather than series operation, and thus to gain full speed production under such conditions. In times of light business, the facility with which the electrical supply can be controlled and cut off proves of great value in comparison with the expense of maintaining coal fires, which must in a large measure be run regardless of the volume of heating demanded."

J. C. Calhoun, *Superintendent*,
Eastern Bridge & Structural Co.,
Worcester, Mass.

* * * * "The Berwick Electric Rivet Heater has been very satisfactory as an economical means of heating rivets."

Frank A. Robbins, Jr., *General Manager*,
Bethlehem Steel Company,
Steelton Plant, Steelton, Pa.

"We very highly recommend the Berwick Electric Rivet Heater. We find rivets are heated quickly and uniformly and absolutely no waste."

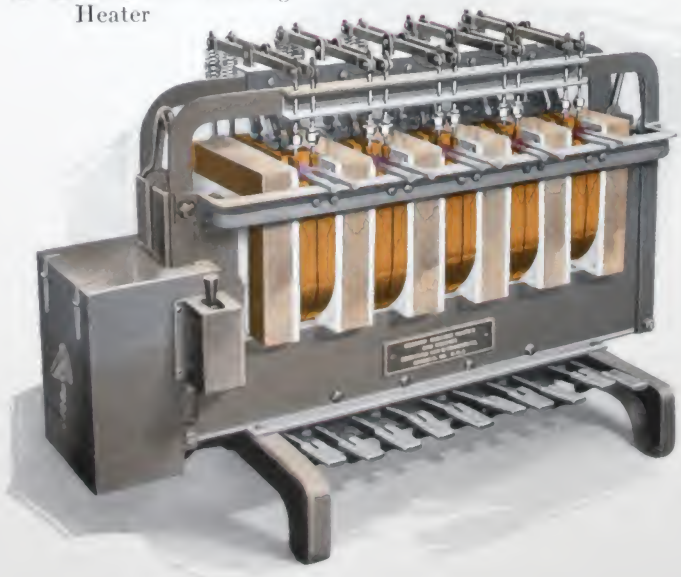
Paul D. Graeff, *Purchasing Agent*,
Coatesville Boiler Works, Coatesville, Pa.

"I am pleased to be able to say that these Heaters have given very good results to date; they have been in use for the past four months."

E. Schrantz, *Electrical Supervisor*,
Canadian National Railways,
Winnipeg, Man., Canada.

No. 3 Five-Electrode Type "D" Berwick Electric Bolt-Heading Heater

No. 3 Ten-Electrode Type "D" Berwick Electric Bolt-Heading Heater



Bolt-Heading or Forging Heater

In principle, these machines are essentially the same as our Rivet Heaters, except that the material to be heated must be inserted in a horizontal rather than in a vertical position, and that there is no limit to the length of the material to be heated. As a general rule, this stock is between two (2) and three (3) feet in length, which does not interfere with the operator's control over the heating-units.

No. 4 Two-Electrode Type "D" Berwick Electric Bolt-Heading Heater

The depression of the foot-treadle raises the pressure-block, permitting the material to be heated to be pushed back against the rear electrode while resting on the forward electrode. The same movement of the foot-treadle draws back the rear electrode, so that when the treadle is released it comes forward sufficiently to make proper contact with the end of the bar, and at the same time gives a slight sliding motion to the bar as it rests on the lower electrode. This motion removes any rust or other foreign substance which might prevent proper contact.

There have not been sufficient Heaters of this type built, nor have they been in operation long enough to give accurate and reliable figures as to electrical consumption. Our tests show that when the end of the bar is heated to the same temperature as is a rivet the electrical consumption averages approximately the same, but a forging heat is higher than a riveting heat, and the electrical consumption depends entirely upon the degree to which the article is heated.

The length of heat can be very easily regulated, in some instances as short as ½″ and up to 1″, 2″, 4″ or more.

This being a new proposition, there has been no attempt at standardizing the Heaters, other than following the standardization of our Rivet Heaters, and each Heater of necessity will have to be built to meet the requirements of the Plant in which it is placed.

Rear View

Standard Sizes

60 cycle, 220 or 440 volt, single phase, but any other standard frequencies and voltages furnished.

Type	No. of Electrodes	Hourly Capacity on Max. Diam. Rivets	Diameter of Rivet	Overall Length of Rivet	Kilowatt Demand
No. 1	2	400	1/4″ to 1/2″	3/4″ to 5″	2 1/2 to 7 1/2
No. 2	2	300	3/8″ to 5/8″	3/4″ to 4 3/4″	3 1/2 to 8 1/2
No. 3	1	75	5/8″ to 1″	3/4″ to 5″	7 1/2 to 15
No. 3	2	110	5/8″ to 1″	3/4″ to 5 1/4″	10 to 20
No. 3	3	250	5/8″ to 1″	1″ to 5 1/4″	18 to 45
No. 3	5	400	5/8″ to 1″	1″ to 5 1/4″	25 to 65
No. 4	1	25	1″ to 1 1/2″	1 1/2″ to 5 3/4″	10 to 20
No. 4	3	75	1″ to 1 1/2″	1 1/2″ to 5 3/4″	20 to 42
No. 4	5	125	1″ to 1 1/2″	1 1/2″ to 5 3/4″	30 to 75

When so ordered, can be built with notched electrodes, giving additional range on No. 3 types 2 3/4″ to 7 3/4″; on No. 4 types 4 1/4″ to 9 1/4″, or longer if required.

For machine driving add 50% to hourly capacity. For boiler or high pressure work reduce hourly capacity 50%.

Type	No. of Electrodes	Net Weight	Gross Weight	Cubic Feet	Code	Dimensions		
						Height	Depth	Length
No. 1	2	355	450	17	YDJEQ	3′ 6″	2′ 2 1/2″	1′ 7″
No. 2	2	519	825	21	YDJHK	3′ 10″	2′ 3″	1′ 10″
No. 3	1	753	900	21	YDJOV	4′ 1″	2′ 2″	1′ 8″
No. 3	2	815	965	21	YDJSN	4′ 1″	2′ 3″	1′ 8″
No. 3	3	1285	1885	39	YDJUJ	4′ 1 1/2″	2′ 2″	3′ 2″
No. 3	5	2650	3350	62	YDJYA	4′ 1 1/2″	2′ 2″	4′ 10 1/2″
No. 4	1	901	1101	24	YDKAB	4′ 9″	2′ 5″	1′ 8″
No. 4	3	2830	3430	62	YDKET	4′ 9″	2′ 5″	4′ 2 1/2″
No. 4	5	3424	4124	70	YDKHN	4′ 9″	2′ 5″	5′ 1/2″

For 25 cycle, use additional code word YDKIL. For 550 Volt, use additional code word YDKEH.

APPROXIMATE WEIGHT OF RIVETS PER 100 IN POUNDS

Length Under Head	DIAMETERS									
	3/8″	1/2″	5/8″	3/4″	7/8″	1″	1 1/8″	1 1/4″	1 3/8″	1 1/2″
1″	5.0	9.96	17.49	27.70	38.55	54.36	71.94	99.20	130.86	158.29
1 1/2″	6.5	12.73	21.80	33.85	46.75	64.89	85.46	115.89	151.04	182.32
2″	8.0	15.50	26.11	40.00	54.95	75.42	98.98	132.59	171.21	206.35
2 1/2″	9.5	18.27	30.42	46.15	63.15	85.96	112.50	149.28	191.38	230.38
3″	11.0	21.04	34.73	52.30	71.35	96.49	126.02	165.98	211.55	254.41
3 1/2″	12.5	23.81	39.04	58.45	79.55	107.02	139.53	182.68	231.72	278.44
4″	14.0	26.58	43.35	64.00	87.75	117.55	153.05	199.37	251.90	302.47
4 1/2″	15.5	29.35	47.66	70.75	95.95	128.08	166.57	216.07	272.07	326.50

Rogers and Company, Chicago and New York